

What is claimed is:

1. A system for producing selected sounds in a space having a suspended ceiling, a plenum above the suspended ceiling,
5 and a hard ceiling above the plenum, said system comprising:

at least one flat panel transducer selectively positioned in said suspended ceiling for directing sound into the space when driven by an audio signal;

an electronics module coupled to said flat panel transducer,
10 said electronics module including a sound generator for generating audio signals and an amplifier coupled to receive audio signals produced by said sound generator, amplify the audio signals, and drive said flat panel transducer to produce sound corresponding to the audio signals; and

15 a system controller in said electronics module coupled to said sound generator, said system controller being configured to receive control signals wirelessly from a remote location and to cause said sound generator to generate sound signals as directed by the control signals.

20 2. The system of claim 1 and further comprising a remote control unit for wirelessly transmitting control signals to said system controller to control the generation of sounds by said flat panel transducer.

3. A system for producing selected sounds in a space as claimed in claim 1 and further comprising an audio effects unit in said electronics module, said audio effects unit being coupled to said sound generator and to said system controller and being
5 configured to receive control signals from said system controller and to apply effects to the sound signals according to said control signals.

10 4. A system for producing selected sounds in a space as claimed in claim 3 and wherein said effects unit includes an audio equalizer.

15 5. A system for producing selected sounds in a space as claimed in claim 1 and further including an audio enhancer in said electronics module for improving the response of the flat panel transducer.

20 6. A system for producing selected sounds in a space as claimed in claim 2 and wherein said remote control unit includes a radio frequency transmitter and said system controller includes an antenna for receiving radio frequency transmissions from said remote control unit.

25 7. A system for producing selected sounds in a space as claimed in claim 1 and further comprising an array of flat panel

transducers mounted in the suspended ceiling, each flat panel transducer having an associated electronics module, said remote control unit being adapted to transmit control signals to each speaker unit independently to control the sounds produced by each of said flat panel transducers independently of the other flat panel transducers.

8. A system for producing selected sounds in a space as claimed in claim 1 and wherein said central paging transmitter is mounted on the hard ceiling.

9. A system for projecting sound into a space, said system comprising a plurality of audio transducers configured and positioned to direct sound into the space upon activation by an amplified audio signal, an electronics module including a sound generator and an audio amplifier associated with each of said audio transducers for generating audio signals, amplifying the audio signals, and driving the corresponding audio transducer, a system controller in each of said electronics modules for receiving control signals from a remote location and controlling the generation of audio signals by said sound generator according to said control signals, and a remoter controller for transmitting selected control signals to said system controllers to control the production of sound by each of said transducers independently of the others of said transducers.

10. An architectural sound enhancement system comprising:
an array of speaker units each having an audio transducer, a
sound generator, an audio amplifier, and a system controller;

5 said system controller of each speaker unit being adapted to
receive wireless control signals from a remote location and to
control said sound generator according to the received control
signals; and

10 a remote control unit for selectively transmitting wireless
control signals to said system controllers of said speaker units
to control the production of sound produced by said units.

11. An architectural sound enhancement system as claimed in
claim 10 and further comprising a paging transmitter for
15 transmitting wireless paging messages, said system controller of
each of said speaker units being adapted to receive paging
messages transmitted by said paging announcement transmitter and
to broadcast the paging messages into the space.

20 12. An architectural sound enhancement system as claimed in
claim 10 and wherein said audio transducers comprise flat panel
transducers.

13. An architectural sound enhancement system as claimed in claim 10 and wherein said speakers units are mountable in a suspended ceiling grid.

5 14. An architectural sound enhancement system as claimed in claim 10 and wherein said sound generator includes a library of stored sounds and wherein said control signals include directions to select sounds from said library of stored sounds for reproduction by said speaker unit.

10 15. An architectural sound enhancement system as claimed in claim 14 and wherein said system controller is adapted to receive uploads of new sounds from said remote control unit and to direct said sound generator to store the new sounds in said sound library.

15 16. An architectural sound enhancement system as claimed in claim 10 and further including an audio effects unit in said speaker unit for adjusting the quality of sound produced thereby, 20 said system controller being adapted to receive wireless effects control signals from said remote controller and to adjust said effects unit according to the received control signals.

25 17. An architectural sound enhancement system as claimed in claim 10 and wherein said audio transducer is a flat panel

transducer and wherein said speaker unit further includes an audio enhancer to enhance the quality of sound produced by said flat panel transducer.

5 18. An architectural sound enhancement system as claimed in claim 10 and further comprising an audio pre-amplifier, said system controller being adapted to receive wireless volume control signals from said remote control unit and to adjust the volume level of said audio pre-amplifier according to said volume control signals.

10 19. A system for producing selected masking sounds in a space having a suspended ceiling, said system comprising:

15 at least one flat panel transducer assembly selectively positioned in said suspended ceiling for directing sound into the space when driven by an audio signal;

20 an electronics module coupled to said flat panel transducer, said electronics module including a masking sound generator for generating masking sound audio signals and an amplifier coupled to receive the masking sound audio signals produced by said sound generator, amplify the audio signals, and drive said flat panel transducer to produce masking sounds; and

 a system controller in said electronics module coupled to said sound generator, said system controller for controlling the

production of masking sound audio signals by said masking sound generator.

20. The system of claim 19 and wherein said system
5 controller is configured to receive control signals wirelessly from a remote location and to cause said sound generator to generate sound signals as directed by the control signals.

10 21. The system of claim 19 and further comprising a pre-filter in said electronics module for filtering the masking sound signals generated by said masking sound generator.

15 22. The system of claim 21 and wherein said pre-filter includes a predetermined dB pre octave filter for shaping the level of said masking sound signals as a function of frequency.

23. The system of claim 22. and wherein said dB per octave filter is a 4dB per octave filger.

20 24. The system of claim 21 and further comprising a post filter in said electronics module for shaping the pre-filtered masking sound signals to compensate for variations in the acoustic characteristics of a room in which said system is installed.

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25. The system of claim 20 and wherein said system controller is further configured to receive radio frequency transmissions including ancillary audio program material to be reproduced by said flat panel speaker.

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26. The system of claim 25 and wherein said ancillary audio program material includes paging signals.

27. The system of claim 25 and wherein said ancillary audio program material includes background music signals.

28. A flat panel speaker system for installation in a suspended ceiling grid, said flat panel speaker system comprising a flat panel transducer, a masking sound generator for generating masking sound signals, an audio amplifier for amplifying the masking sound signals and driving the transducer to produce and project masking sounds, and a controller for controlling the production of masking sound signals by said masking sound generator.

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29. A flat panel speaker system as claimed in claim 28 and further comprising a radio frequency receiver in said controller for receiving radio frequency signals and controlling said masking sound generator in response thereto.

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30. A flat panel speaker system as claimed in claim 29 ad
wherein said receiver also receives ancillary audio program
signals and wherein said controller is configured to direct said
received signals to said audio amplifier for reproduction by said
5 flat panel transducer.

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